TITLE OF THE INVENTION

COMBINATION HOOD AND MICROWAVE OVEN

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application claims the benefit of Korean Application No. 2002-8175, filed February 10, 2003, in the Korean Intellectual Property Office, the disclosure of which is incorporated herein by reference.

BACKGROUND OF THE INVENTION

1. Field of the Invention

[0002] The present invention relates, in general, to a microwave oven and, more particularly, to a combination hood and microwave oven, installed over a cooking apparatus, such as a cooktop, to suck and discharge odors and smoke generated during cooking using the cooking apparatus.

2. Description of the Related Art

[0003] Generally a combination hood and microwave oven is installed over a cooking apparatus, such as an electrical oven or a gas oven, and carries out general cooking functions of a microwave oven and sucks odors and smoke coming up from a cooking apparatus disposed thereunder and discharges them to the outside.

[0004] FIG. 1 is a view showing the construction and installation of a conventional combination hood and microwave oven. As shown in FIG. 1, in a body 102 of the combination hood and microwave oven, are a cooking cavity (not shown) in which food is cooked, and a machine room 110 in which various kinds of electrical parts are installed. In the lower portion, both side portions and upper portion of the cooking cavity and the machine room 110, is an exhaust channel 106 that sucks odors or smoke generated from a cooktop 104 disposed below the body 102. In the upper back portion of the body 102, an exhaust fan 108 is installed to forcibly discharge the odors or smoke sucked through the exhaust channel 106. In the inlet of the exhaust channel 106 positioned at the lower portion of the body 102, is a variable suction hole 106a whose suction area is varied by a slidable opening and closing member 112. The

slidable opening and closing member 112 is operated by a variable suction hole motor (not shown).

[0005] In the conventional combination hood and microwave oven, a switch that turns an exhaust motor on or off, and another switch that controls the rotational speed of the exhaust motor are mounted. Additionally, a control switch that controls the suction area of the variable suction hole 106a is separately mounted in the microwave oven. A user individually manipulates the switches to turn on the exhaust motor, and then controls the rotational speed of the exhaust motor and controls the suction area of the variable suction hole 106a according to the rotational speed of the exhaust motor.

[0006] As described above, the exhaust function of the conventional combination hood and microwave oven having a plurality of switches is accompanied by a number of switch manipulations. Additionally, the conventional combination hood and microwave oven needs a complicated drive circuit that controls the on/off operation and rotational speed of the exhaust motor and the suction area of the variable suction hole, so that its manufacturing cost is high.

SUMMARY OF THE INVENTION

[0007] Accordingly, it is an aspect of the present invention to provide a combination hood and microwave oven, in which the construction of a drive circuit relating to an exhaust device is simplified, thereby reducing its manufacturing cost, and in which the number of user manipulations required to operate the exhaust device is reduced, thereby providing convenience of use to the user.

[0008] Additional aspects and advantages of the invention will be set forth in part in the description which follows and, in part, will be obvious from the description, or may be learned by practice of the invention.

[0009] The foregoing and/or other aspects of the present invention are achieved by providing a combination hood and microwave oven including a variable suction hole whose suction area is variable, a variable suction hole motor allowing a suction area of the variable suction hole to vary, an exhaust motor that discharges air sucked through the variable suction hole to outside the combination hood and microwave oven, an exhaust motor drive unit that controls a rotational speed of the exhaust motor, and a variable suction hole adjusting unit that controls the

variable suction hole motor allowing a suction area of the variable suction hole to vary according to the rotational speed of the exhaust motor.

BRIEF DESCRIPTION OF THE DRAWINGS

[0010] These and/or other aspects and advantages of the invention will become apparent and more readily appreciated from the following description of the preferred embodiments, taken in conjunction with the accompanying drawings of which:

FIG. 1 is a view showing the construction and installation of a conventional combination hood and microwave oven;

FIG. 2 is a block diagram showing the construction of a combination hood and microwave oven, according to an embodiment of the present invention;

FIG. 3 is a view showing the construction of an exhaust motor drive unit and a variable suction hole adjusting unit of the combination hood and microwave oven of FIG. 2 ; and

FIGS. 4 and 5 are views showing the operations of the exhaust motor drive unit and the variable suction hole adjusting unit of the combination hood and microwave oven of the present invention, respectively.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0011] Reference will now be made in detail to the preferred embodiments of the present invention, examples of which are illustrated in the accompanying drawings, wherein like reference numerals refer to like elements throughout.

[0012] FIG. 2 is a block diagram showing the construction of a combination hood and microwave oven, according to an embodiment of the present invention. As shown in FIG. 2, a control unit 202, controlling the overall operation of the microwave oven, is connected at its input terminals to an input unit 204 and a sensor unit 206. The input unit 204 is provided with a cooking mode set button that allows a user to set cooking modes, and numeral buttons that allow a user to set cooking time. The sensor unit 206 senses the cooking state in a cooking cavity. The control unit 202 is connected at its output terminals to a magnetron drive unit 208, a cooling fan drive unit 212, a tray drive unit 216, a display drive unit 220, an exhaust motor drive unit 224, and a variable suction hole adjusting unit 228. The magnetron drive unit 208 drives a magnetron 210 to generate microwaves. The cooling fan drive unit 212 drives a cooling fan motor 214 disposed in a machine room (not shown) of the microwave oven to prevent various

kinds of electrical parts from being overheated. The tray drive unit 216 drives a tray motor 218 to rotate a tray (not shown) disposed in the cooking cavity. The display drive unit 220 drives a display unit 222 to display a help menu and cooking information of cooking modes, and set values. The exhaust motor drive unit 224 controls the on/off operation and rotational speed of an exhaust motor 226. The variable suction hole adjusting unit 228 controls the suction area of the variable suction hole 106a by changing the rotating direction of a variable suction hole motor 230 and therefore allowing the opening and closing member 112 to move forward or backward as shown in FIG. 1.

[0013] FIG. 3 is a view showing the construction of the exhaust motor drive unit 224 and the variable suction hole adjusting unit 228 of the combination hood and microwave oven shown in FIG. 2, according to the present invention. As shown in FIG. 3, the exhaust motor drive unit 224 controls the rotational speed of the exhaust motor 226 to be low or high according to the on/off operation of a first exhaust switch 306 and a second exhaust switch 310. In this case, the rotational speed of the exhaust motor 226 corresponds to exhaust capacity of the combination hood and microwave oven of the present invention.

[0014] A relay 304 provided in the exhaust motor drive unit 224 has normally open contact points 304a and normally closed contact points 304b. A normally open state indicates that, when the relay 304 is excited, open contact points are closed and then electrically connected to each other. In contrast, a normally closed state indicates that, when the relay 304 is excited, closed contact points 304b are opened and then electrically disconnected from each other. The normally open contact points 304a of the relay 304 are directly connected between a power supply 302 and the exhaust motor VM 226, while the normally closed contact points 304b are connected in series to normally open contact points 308a of another relay 308, and are connected between the power supply 302 and the exhaust motor VM 226.

[0015] The variable suction hole adjusting unit 228 is provided with two limit switches 312a and 312b that control the rotating direction of the variable suction hole motor HM 230. The limit switch 312b is turned on in the initial stage of operation of a hood, is connected in series to the normally open contact point 304a of the exhaust motor drive unit 224, and allows power to be supplied to the variable suction hole drive motor HM 230 when the normally open contact points 304a are closed. The variable suction hole motor HM 230 is rotated forward so that the variable suction hole is opened, when the normally open contact points 304a are closed and power is

supplied. Thereafter, by being automatically turned off, the limit switch 312b allows the variable suction hole motor HM 230 to be stopped, when the variable suction hole is completely opened to a maximum hole size.

[0016] Another limit switch 312a, turned off in the initial stage of operation of the hood, is connected in series to the normally closed contact points 304b of the exhaust motor drive unit 224, and allows power to be supplied to the variable suction hole drive motor HM 230 when the normally closed contact points 304a are closed. The variable suction hole motor HM 230 is rotated in reverse so that the variable suction hole is closed, when the normally closed contact points 304a are closed and power is supplied. By being automatically turned off, the limit switch 312a enables the variable suction hole motor HM 230 to be stopped when the variable suction hole is partially closed to a predetermined hole size.

[0017] Therefore, since the limit switch 312b is already turned on when the exhaust motor VM 226 is rotated at a high speed, the variable suction hole motor HM 230 is rotated forward so that the variable suction hole is opened. In contrast, when the exhaust motor VM 226 is rotated at a low speed, the control unit 202 turns the limit switch 312a on so that the variable suction hole motor HM 230 is rotated in reverse, and allows the variable suction hole to be closed until the variable suction hole has a predetermined suction area. The control unit 202 examines the states of the normally open contact points 304a and 308a of the exhaust motor drive unit 224 to determine the rotational speed of the exhaust motor VM 226, or examines the rotational speed of the exhaust motor VM 226 by directly detecting the rotational speed of the exhaust motor VM 226 and comparing the detected rotational speed with a reference value.

[0018] The detailed operations of the exhaust motor drive unit 224 and the variable suction hole adjusting unit 228 will be described with reference to FIGS. 4 and 5. FIG. 4 is a view showing the case where a user turns only a second exhaust switch 310 on. As shown in FIG. 4, if the second exhaust switch 310 is turned on by the user's manipulation while a first exhaust switch 306 of the exhaust motor drive unit 224 is turned off at the initial stage of operation of the hood, the relay 308 is excited and normally open contact points 308a are closed. Accordingly, power is supplied to the exhaust motor VM 226 through the normally open contact points 308a which are closed and the normally closed contact points 304b which are also closed, and thus the exhaust motor 226 is rotated at a low speed. Since two limit switches 312a and 312b of the variable suction hole adjusting unit 228 are turned on, but the normally open contact points

304a of the exhaust motor drive unit 224 are opened, power is supplied through only the limit switch 312a of the variable suction hole adjusting unit 228, so that the variable suction hole drive motor 230 is rotated in reverse and the variable suction hole is partially closed to a predetermined suction area.

[0019] FIG. 5 is a view showing the case where a user turns the first exhaust switch 306 on while the second switch 310 is turned on. As shown in FIG. 5, if the first exhaust switch 306 is turned on by the user's manipulation while the second exhaust switch 310 is turned on, the relay 304 is excited and the normally closed contact points 304b are opened and the normally open contact points 304a are closed. Accordingly, power is supplied to the exhaust motor VM 226 through the normally open contact points 304a which are closed, thus the exhaust motor is rotated at a high speed. Further, power is supplied to the variable suction hole motor HM 230 through the normally open contact points 304a which are closed and the limit switch 312b which are previously turned on, so that the variable suction motor 230 is forwardly rotated so that the variable suction hole is opened.

[0020] As is apparent from the above description, the present invention provides a combination hood and microwave oven, in which a suction area is varied according to the rotational speed of the exhaust motor, thereby simplifying a drive circuit relating to an exhaust device and reducing the number of user's manipulations required to operate the exhaust device. Accordingly, the combination hood and microwave oven of the present invention may be manufactured at a lower cost and implemented to provide convenience of use.

[0021] Although a few embodiments of the present invention have been shown and described, it would be appreciated by those skilled in the art that changes may be made in these embodiments without departing from the principles and spirit of the invention, the scope of which is defined in the claims and their equivalents.